

In the Claims

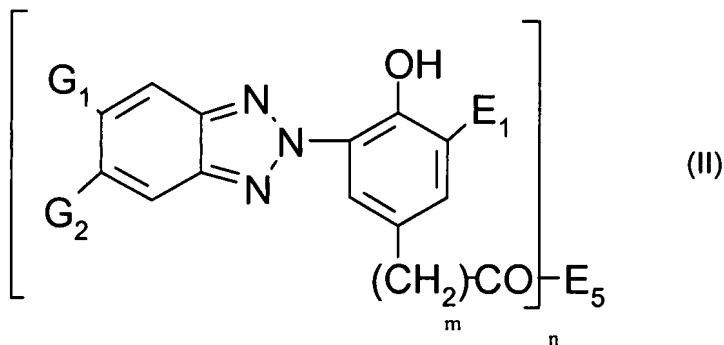
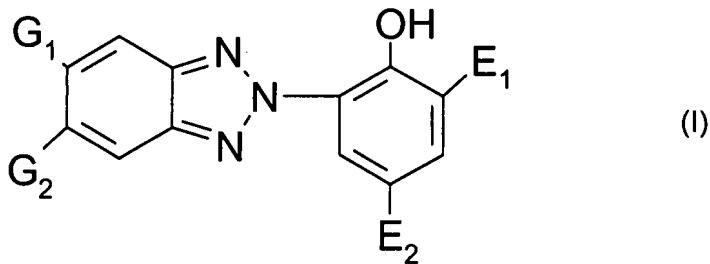
1. (currently amended) A method of protecting contents against the deleterious effects of ultraviolet radiation,

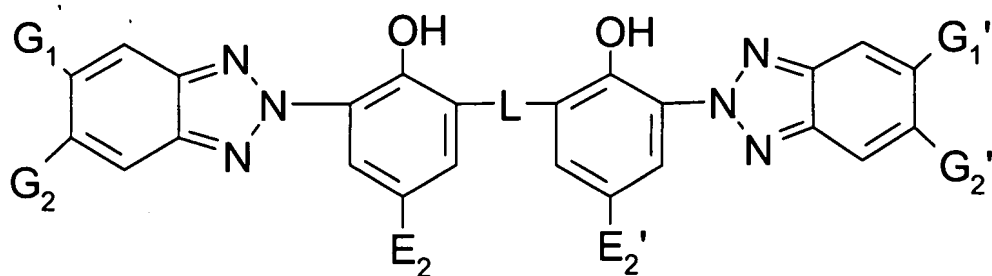
which method comprises storing the contents in a clear or lightly colored rigid plastic container,

which container comprises

an effective stabilizing amount of one or more compounds selected from the group consisting of the durable hydroxyphenyl benzotriazole UV absorbers,

wherein said benzotriazole UV absorbers are of formula (I), (II) or (III)





(III)

wherein

G_1 and G_1' are independently hydrogen or halogen,

G_2 and G_2' are independently hydrogen, halogen, nitro, cyano, perfluoroalkyl of 1 to 12 carbon atoms, $-\text{COOG}_3$, $-\text{P}(\text{O})(\text{C}_6\text{H}_5)_2$, $-\text{CO-G}_3$, $-\text{CO-NH-G}_3$, $-\text{CO-N}(\text{G}_3)_2$, $-\text{N}(\text{G}_3)-\text{CO-G}_3$, $\text{E}_3\text{SO-}$ or E_3SO_2^- ,

G_3 is hydrogen, straight or branched chain alkyl of 1 to 24 carbon atoms, straight or branched chain alkenyl of 2 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenylalkyl of 7 to 15 carbon atoms, phenyl, or said phenyl or said phenylalkyl substituted on the phenyl ring by 1 to 4 alkyl of 1 to 4 carbon atoms,

E_1 is phenylalkyl of 7 to 15 carbon atoms or phenyl, or said phenyl or said phenylalkyl substituted on the phenyl ring by 1 to 4 alkyl of 1 to 4 carbon atoms,

E_2 and E_2' are independently straight or branched alkyl chain of 1 to 24 carbon atoms, straight or branched chain alkenyl of 2 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenyl or phenyl substituted by one to three alkyl of 1 to 4 carbon atoms; or E_2 and E_2' are independently said alkyl of 1 to 24 carbon atoms or said alkenyl of 2 to 18 carbon atoms substituted by one or more $-\text{OH}$, $-\text{OCOE}_{11}$, $-\text{OE}_4$, $-\text{NCO}$, $-\text{NH}_2$, $-\text{NHCOE}_{11}$, $-\text{NHE}_4$ or $-\text{N}(\text{E}_4)_2$, or mixtures thereof, where E_4 is straight or branched chain alkyl of 1 to 24 carbon atoms; or said alkyl or said alkenyl interrupted by one or more $-\text{O-}$, $-\text{NH-}$ or $-\text{NE}_4-$ groups or mixtures thereof and which can be unsubstituted or substituted by one or more $-\text{OH}$, $-\text{OE}_4$ or $-\text{NH}_2$ groups or mixtures thereof;

n is 1 or 2,

when n is 1, E₅ is OE₆ or NE₇E₈, or

E₅ is -PO(OE₁₂)₂, -OSi(E₁₁)₃ or -OCO-E₁₁,

or straight or branched chain C₁-C₂₄alkyl which is interrupted by -O-, -S- or -NE₁₁ and which can be unsubstituted or substituted by -OH or -OCO-E₁₁, C₅-C₁₂ cycloalkyl which is unsubstituted or substituted by -OH, straight chain or branched C₂-C₁₈alkenyl which is unsubstituted or substituted by -OH, C₇-C₁₅aralkyl, -CH₂-CHOH-E₁₃ or glycidyl,

E₆ is hydrogen, straight or branched chain C₁-C₂₄alkyl which is unsubstituted or substituted by one or more OH, OE₄ or NH₂ groups, or -OE₆ is -(OCH₂CH₂)_wOH or -(OCH₂CH₂)_wOE₂₁ where w is 1 to 12 and E₂₁ is alkyl of 1 to 12 carbon atoms,

E₇ and E₈ are independently hydrogen, alkyl of 1 to 18 carbon atoms, straight or branched chain C₃-C₁₈alkyl which is interrupted by -O-, -S- or -NE₁₁-, C₅-C₁₂cycloalkyl, C₆-C₁₄aryl or C₁-C₃hydroxylalkyl, or E₇ and E₈ together with the N atom are a pyrrolidine, piperidine, piperazine or morpholine ring,

E₅ is -X-(Z)_p-Y-E₁₅

wherein

X is -O- or -N(E₁₆)-,

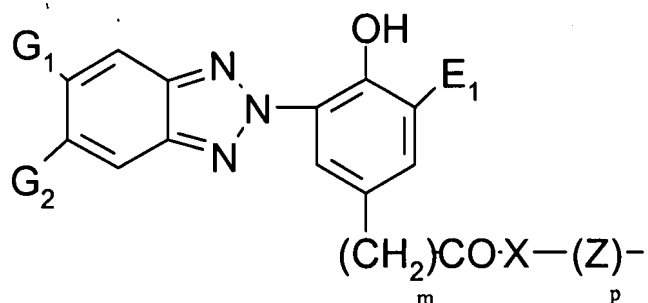
Y is -O- or -N(E₁₇)-,

Z is C₂-C₁₂-alkylene, C₄-C₁₂-alkylene interrupted by one to three nitrogen atoms, oxygen atoms or a mixture thereof, or is C₃-C₁₂-alkylene, butenylene, butynylene, cyclohexylene or phenylene, each substituted by a hydroxyl group,

m is zero, 1 or 2,

p is 1, or p is also zero when X and Y are -N(E₁₆)- and -N(E₁₇)-, respectively,

E₁₅ is a group -CO-C(E₁₈)=C(H)E₁₉ or, when Y is -N(E₁₇)-, forms together with E₁₇ a group -CO-CH=CH-CO-, wherein E₁₈ is hydrogen or methyl, and E₁₉ is hydrogen, methyl or -CO-X-E₂₀, wherein E₂₀ is hydrogen, C₁-C₁₂-alkyl or a group of the formula

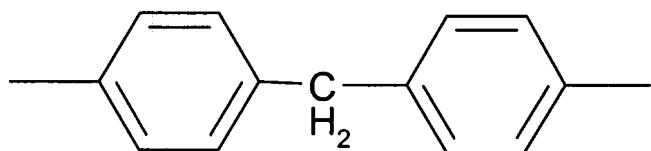


wherein the symbols E_1 , G_2 , X , Z , m and p have the meanings defined above, and E_{16} and E_{17} independently of one another are hydrogen, C_1 - C_{12} -alkyl, C_3 - C_{12} -alkyl interrupted by 1 to 3 oxygen atoms, or is cyclohexyl or C_7 - C_{15} aralkyl, and E_{16} together with E_{17} in the case where Z is ethylene, also forms ethylene,

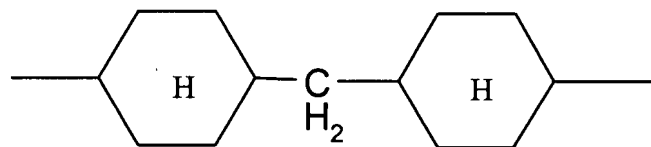
when n is 2, one of G_2 is also hydrogen, E_5 is one of divalent radicals $-O-E_9-O-$ or $-N(E_{11})-E_{10}-N(E_{11})-$,

E_9 is C_2 - C_8 alkylene, C_4 - C_8 alkenylene, C_4 alkynylene, cyclohexylene, straight or branched chain C_4 - C_{10} alkylene which is interrupted by $-O-$ or by $-\text{CH}_2-\text{CHOH}-\text{CH}_2-\text{O}-E_{14}-\text{O}-\text{CH}_2-\text{CHOH}-\text{CH}_2-$,

E_{10} being straight or branched chain C_2 - C_{12} alkylene which may be interrupted by $-O-$, cyclohexylene, or

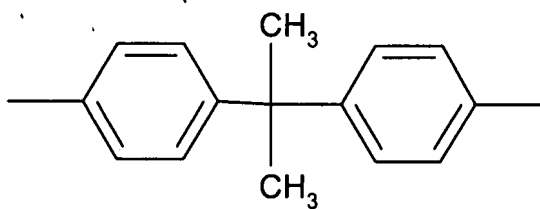


or

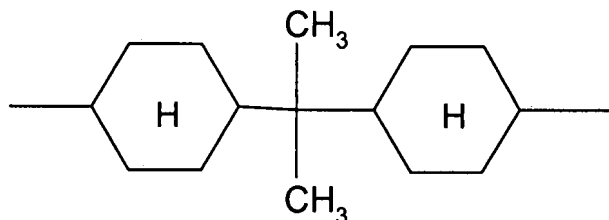


or E_{10} and E_{11} with the two nitrogen atoms form a piperazine ring,

E_{14} is straight or branched chain C_2 - C_8 alkylene, straight or branched chain C_4 - C_{10} alkylene which is interrupted by $-O-$, cycloalkylene, arylene or



or



where E_7 and E_8 are independently hydrogen, alkyl of 1 to 18 carbon atoms or E_7 and E_8 together are alkylene of 4 to 6 carbon atoms, 3-oxapentamethylene, 3-iminopentamethylene or 3-methyliminopentamethylene,

E_{11} is hydrogen, straight or branched chain C_1 - C_{18} alkyl, C_5 - C_{12} cycloalkyl, straight or branched chain C_2 - C_{18} alkenyl, C_6 - C_{14} aryl or C_7 - C_{15} aralkyl,

E_{12} is straight or branched chain C_1 - C_{18} alkyl, straight or branched chain C_3 - C_{18} alkenyl, C_5 - C_{10} cycloalkyl, C_6 - C_{16} aryl or C_7 - C_{15} aralkyl,

E_{13} is H, straight chain or branched C_1 - C_{18} alkyl which is substituted by $-PO(OE_{12})_2$, phenyl which is unsubstituted or substituted by OH, C_7 - C_{15} aralkyl or $-CH_2OE_{12}$,

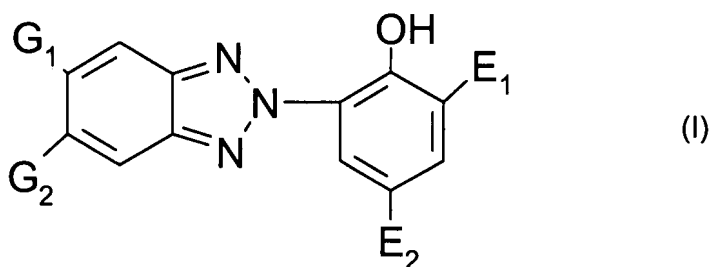
E_3 is alkyl of 1 to 20 carbon atoms, hydroxyalkyl of 2 to 20 carbon atoms, alkyl substituted by alkoxy carbonyl of 2 to 9 carbon atoms, alkenyl of 3 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenylalkyl of 7 to 15 carbon atoms, aryl of 6 to 10 carbon atoms or said aryl substituted by one or two alkyl of 1 to 4 carbon atoms or 1,1,2,2-tetrahydroperfluoroalkyl where the perfluoroalkyl moiety is of 6 to 16 carbon atoms, and

L is alkylene of 1 to 12 carbon atoms, alkylidene of 2 to 12 carbon atoms, benzylidene, p-xylylene, $\alpha,\alpha,\alpha',\alpha'$ -tetramethyl-m-xylylene or cycloalkylidene; and

wherein the UV absorbers are incorporated into a coating applied to the outer surface of the container.

2. (canceled)

3. (previously presented) A method according to claim 1 wherein said benzotriazole UV absorbers are of formula (I)



wherein

G₁ is hydrogen,

G₂ is hydrogen, cyano, chloro, fluoro, CF₃-, -CO-G₃, E₃SO- or E₃SO₂-,

G₃ is straight or branched chain alkyl of 1 to 24 carbon atoms, straight or branched chain alkenyl of 2 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenylalkyl of 7 to 15 carbon atoms, phenyl, or said phenyl or said phenylalkyl substituted on the phenyl ring by 1 to 4 alkyl of 1 to 4 carbon atoms,

E₁ is phenylalkyl of 7 to 15 carbon atoms, phenyl, or said phenyl or said phenylalkyl substituted on the phenyl ring by 1 to 4 alkyl of 1 to 4 carbon atoms,

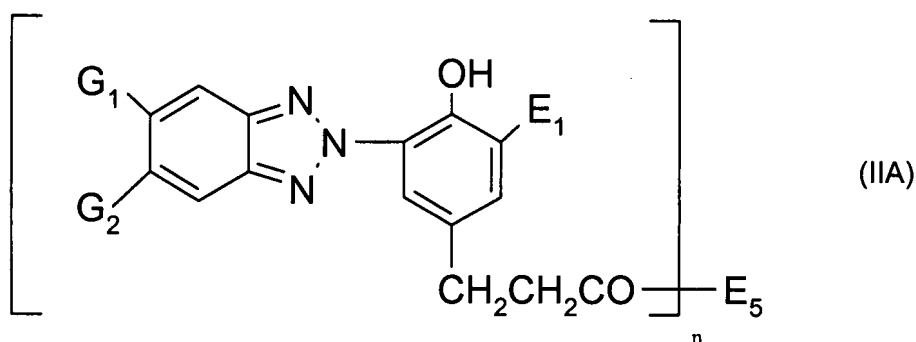
E₂ is straight or branched alkyl chain of 1 to 24 carbon atoms, straight or branched chain alkenyl of 2 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenyl or phenyl substituted by 1 to 3 alkyl of 1 to 4 carbon atoms; or E₂ is said alkyl of 1 to 24 carbon atoms or said alkenyl of 2 to 18 carbon atoms substituted by one or more -OH, -OCOE₁₁, -OE₄, -NCO, -NH₂, -NHCOE₁₁, -NHE₄ or

-N(E₄)₂, or mixtures thereof, where E₄ is straight or branched chain alkyl of 1 to 24 carbon atoms; or said alkyl or said alkenyl interrupted by one or more -O-, -NH- or -NE₄- groups or mixtures thereof and which can be unsubstituted or substituted by one or more -OH, -OE₄ or -NH₂ groups or mixtures thereof;

and

E₃ is alkyl of 1 to 20 carbon atoms, hydroxyalkyl of 2 to 20 carbon atoms, alkenyl of 3 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenylalkyl of 7 to 15 carbon atoms, aryl of 6 to 10 carbon atoms or said aryl substituted by one or two alkyl of 1 to 4 carbon atoms or 1,1,2,2-tetrahydroperfluoroalkyl where the perfluoroalkyl moiety is of 6 to 16 carbon atoms.

4. **(previously presented)** A method according to claim 1 wherein said benzotriazole UV absorbers of formula (II) are of the formula (IIA)



wherein

G₁ is hydrogen,

G₂ is hydrogen, CF₃- or fluoro,

E₁ is phenylalkyl of 7 to 15 carbon atoms,

E₅ is -OE₆ or -NE₇E₈, or

E₅ is

-X-(Z)_p-Y-E₁₅

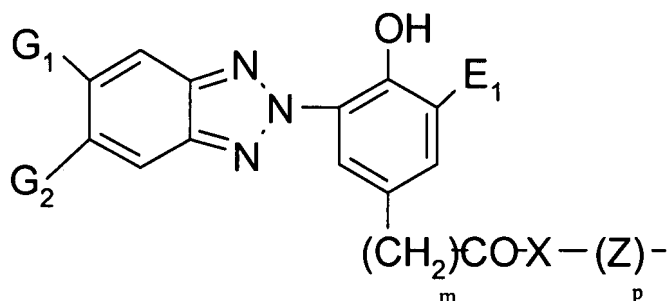
wherein

X is -O- or -N(E₁₆)-,

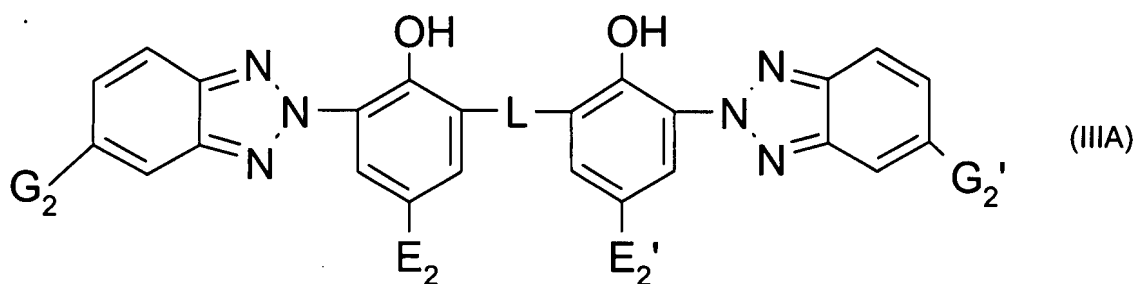
Y is -O- or -N(E₁₇)-,

Z is C₂-C₁₂-alkylene, C₄-C₁₂-alkylene interrupted by one to three nitrogen atoms, oxygen atoms or a mixture thereof, or is C₃-C₁₂-alkylene, butenylene, butynylene, cyclohexylene or phenylene, each substituted by a hydroxyl group,

E₁₅ is a group -CO-C(E₁₈)=C(H)E₁₉ or, when Y is -N(E₁₇)-, forms together with E₁₇ a group -CO-CH=CH-CO-, wherein E₁₈ is hydrogen or methyl, and E₁₉ is hydrogen, methyl or -CO-X-E₂₀, wherein E₂₀ is hydrogen, C₁-C₁₂-alkyl or a group of the formula



5. (previously presented) A method according to claim 1 wherein said benzotriazole UV absorbers of formula (III) are of the formula (IIIA)



wherein

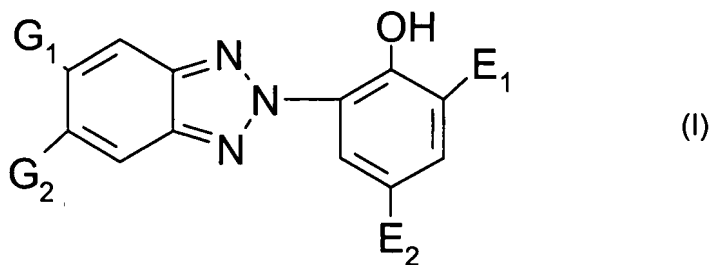
G_2 is CF_3 ,

G_2' is hydrogen or CF_3 ,

E_2 and E_2' are independently straight or branched alkyl chain of 1 to 24 carbon atoms, straight or branched chain alkenyl of 2 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenyl or phenyl substituted by 1 to 3 alkyl of 1 to 4 carbon atoms; and

L is alkylene of 1 to 12 carbon atoms, alkylidene of 2 to 12 carbon atoms, benzylidene, p-xylylene, $\alpha,\alpha,\alpha',\alpha'$ -tetramethyl-m-xylylene or cycloalkylidene.

6. (previously presented) A method according to claim 1 wherein said benzotriazole UV absorbers are of formula (I)



wherein

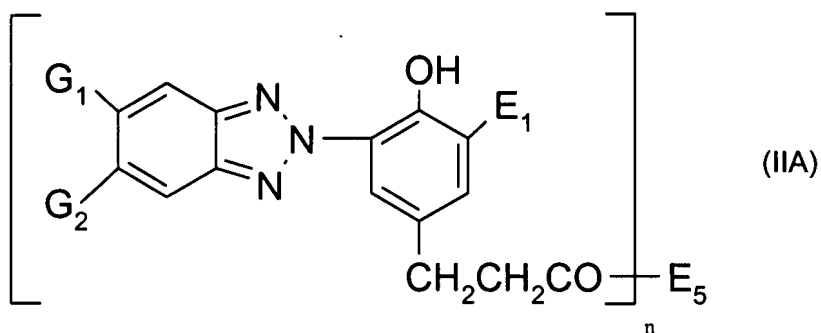
G_1 is hydrogen,

G₂ is CF₃-,

E₁ is phenylalkyl of 7 to 15 carbon atoms, phenyl, or said phenyl or said phenylalkyl substituted on the phenyl ring by 1 to 4 alkyl of 1 to 4 carbon atoms and

E₂ is straight or branched alkyl chain of 1 to 24 carbon atoms, straight or branched chain alkenyl of 2 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenyl or phenyl substituted by 1 to 3 alkyl of 1 to 4 carbon atoms; or E₂ is said alkyl of 1 to 24 carbon atoms or said alkenyl of 2 to 18 carbon atoms substituted by one or more -OH, -OCOE₁₁, -NH₂ or -NHCOE₁₁, or mixtures thereof, or said alkyl or said alkenyl interrupted by one or more -O- and which can be unsubstituted or substituted by one or more -OH.

7. (previously presented) A method according to claim 1 wherein said benzotriazole UV absorbers of formula (II) are of the formula (IIA)



wherein

G₁ is hydrogen,

G₂ is CF₃-,

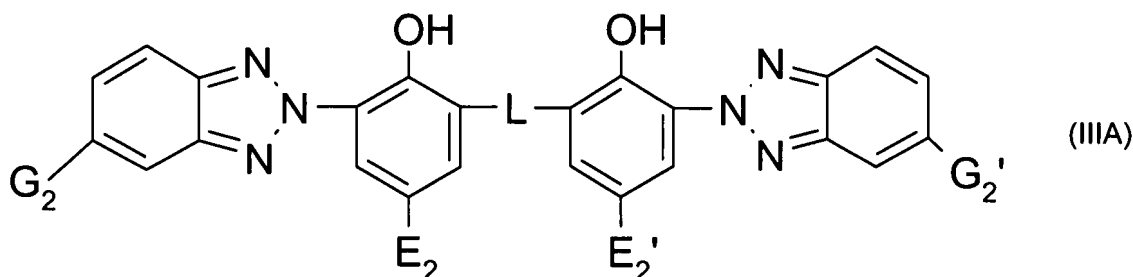
E₁ is phenylalkyl of 7 to 15 carbon atoms,

E_5 is $-OE_6$ or $-NE_7E_8$ where

E_6 is hydrogen, straight or branched chain C_1 - C_{24} alkyl which is unsubstituted or substituted by one or more OH groups, or $-OE_6$ is $-(OCH_2CH_2)_wOH$ or $-(OCH_2CH_2)_wOE_{21}$ where w is 1 to 12 and E_{21} is alkyl of 1 to 12 carbon atoms, and

E_7 and E_8 are independently hydrogen, alkyl of 1 to 18 carbon atoms, straight or branched chain C_3 - C_{18} alkyl which is interrupted by $-O-$, $-S-$ or $-NE_{11}-$, C_5 - C_{12} cycloalkyl, C_6 - C_{14} aryl or C_1 - C_3 hydroxylalkyl, or E_7 and E_8 together with the N atom are a pyrrolidine, piperidine, piperazine or morpholine ring.

8. (previously presented) A method according to claim 1 wherein said benzotriazole UV absorbers of formula (III) are of the formula (IIIA)



wherein

G_2 is CF_3 ,

$G_{2'}$ is hydrogen or CF_3 ,

E_2 and $E_{2'}$ are independently straight or branched alkyl chain of 1 to 24 carbon atoms, straight or branched chain alkenyl of 2 to 18 carbon atoms, cycloalkyl of 5 to 12 carbon atoms, phenyl or phenyl substituted by 1 to 3 alkyl of 1 to 4 carbon atoms; and

L is methylene.

9. (currently amended) A method according to claim 1 wherein said benzotriazole UV absorbers are selected from the group consisting of

- (a) 5-trifluoromethyl-2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole;
- (d) 2,2'-methylene-bis[6-(5-trifluoromethyl-2H-benzotriazol-2-yl)-4-tert-octylphenol];
- (e) methylene-2-[4-tert-octyl-6-(2H-benzotriazol-2-yl)phenol]2'-[4-tert-butyl-6-(5-trifluoromethyl-2H-benzotriazol-2-yl)phenol];
- (j) 5-butylsulfonyl-2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole;
- (n) 5-trifluoromethyl-2-(2-hydroxy-3- α -cumyl-5-tert-butylphenyl)-2H-benzotriazole;
- (o) 5-trifluoromethyl-2-(2-hydroxy-3- α -cumyl-5-nonylphenyl)-2H-benzotriazole;
- (p) 5-trifluoromethyl-2-[2-hydroxy-3- α -cumyl-5-(2-hydroxyethyl)phenyl]-2H-benzotriazole;
- (q) 5-trifluoromethyl-2-[2-hydroxy-3- α -cumyl-5-(3-hydroxypropyl)phenyl]-2H-benzotriazole;
- [[:]]
- (ee) 5-chloro-2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole; and
- (gg) 2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole.

10. (previously presented) A method according to claim 1 wherein said benzotriazole UV absorbers are selected from the group consisting of

- (a) 5-trifluoromethyl-2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole;
- (j) 5-butylsulfonyl-2-(2-hydroxy-3- α -cumyl-5-tert-octylphenyl)-2H-benzotriazole; and
- (n) 5-trifluoromethyl-2-(2-hydroxy-3- α -cumyl-5-tert-butylphenyl)-2H-benzotriazole.

11-18. (canceled)

19. (previously presented) A method according to claim 1 wherein said container comprises at least one hydroxyphenyl benzotriazole UV absorber and at least one further UV absorber selected from the group consisting of the tris-aryl-s-triazine UV absorbers, or which comprises a mixture of two or more hydroxyphenyl benzotriazole UV absorbers.

20. (previously presented) A method according to claim 1 wherein said container additionally comprises at least one UV absorber selected from the group consisting of 2-(2-hydroxy-3,5-di- α -cumyl)-2H-benzotriazole, 5-chloro-2-(2-hydroxy-3-tert-butyl-5-methylphenyl)-2H-benzotriazole, 5-chloro-2-(2-hydroxy-3,5-di-tert-butylphenyl)-2H-benzotriazole and 4,6-diphenyl-2-(4-hexyloxy-2-hydroxyphenyl)-s-triazine.

21. (previously presented) A method according to claim 1 in which said contents are selected from the group consisting of fruit juices, soft drinks, beer, wines, meats, vegetables, food products, dairy products, personal care products, cosmetics, shampoos, vitamins, pharmaceuticals, inks, dyes and pigments.

22. (previously presented) A method according to claim 1 wherein said container is a mono- or multi-layered container

wherein each layer is comprised of one or more polymers selected from the group consisting of polyesters, polyolefins, polyolefin copolymers, polyethylene-vinyl acetate, polystyrene, poly(vinyl chloride), poly(vinylidene chloride), polyamides, cellulose, polycarbonates, polyethylene-vinyl alcohol, poly(vinyl alcohol), poly(vinyl alcohol) copolymers, polystyrene-acrylonitrile, ionomers, partially hydrolyzed poly(vinyl acetate), poly(ethylene-co-vinyl alcohol), polyvinylidene chloride, polyurethanes, polyvinylidene chloride and polyepoxies.

23. (previously presented) A method according to claim 22 in which at least one layer is comprised of a polymer selected from the group consisting of poly(ethylene terephthalate), polyethylene and polypropylene.

24. (canceled)

25. (previously presented) A method according to claim 1 in which the UV absorbers are present from about 0.1 to about 20 % by weight based on the weight of the plastic container.

26. (previously presented) A method according to claim 1 where the container additionally comprises at least one coadditive selected from the group consisting of antioxidants, other UV absorbers, hindered amines, phosphites or phosphonites, hydroxylamines, nitrones, benzofuran-2-ones, thiosynergists, polyamide stabilizers, metal stearates, nucleating agents, fillers, reinforcing agents, lubricants, emulsifiers, dyes, pigments, optical brighteners, flame retardants, antistatic agents and blowing agents.